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Geotechnical Laboratory
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CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

January 5, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	Eberline - Hanford
Shaw Project Number:	100846.36000000
Client Sample Data Group:	H2843
Date Received by Lab:	November 23, 2004
Number of Samples:	One (1)
Sample Type:	Soil

RECEIVED
AUG 22 2005
EDMC

I. Introduction/Case Narrative

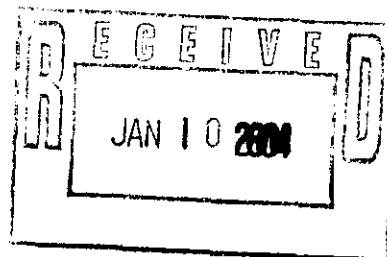
One soil sample was received by the Shaw Geotechnical Laboratory on November 23, 2004. The sample was submitted for determination of moisture content, bulk density, sieve analysis, permeability, specific gravity and calcium carbonate content. The sample number received was B19ND3.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole
Laboratory Manager, Geotechnical Services



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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock.....	ASTM D 2216
Bulk Density of Soils.....	EM 1110-2-1906
Particle-size Analysis of Soils	ASTM D 422
Hydraulic Conductivity of Porous Materials Using a Flexible Wall Permeameter	ASTM D 5084
Specific Gravity of Soil.....	ASTM D 854
Calcium Carbonate Content.....	ASTM D 4373

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.
- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

This soil sample contained a significant amount of oversize particles. Therefore, in addition to the normal specific gravity test (ASTM D 854) the specific gravity of the coarse fraction was determined by ASTM C 127. The value representing the overall sample specific gravity is given as "average bulk specific gravity". Other values are given that relate to materials used in civil engineering fields.

Appendix A
Sample Cross-Reference List

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Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.36000000
SDG No. H2843

**Shaw Geotechnical
Laboratory
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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.

CLIENT SAMPLE NO.

MATRIX

BC0475 B19ND3..... Soil

00000005

Appendix B
Sample Test Results

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100846.36000000

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Moisture content calculated by ASTM D 2216 based on sample dry weight.

Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).

Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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PARTICLE-SIZE DISTRIBUTION ASTM D 422

Project Name Eberline Hanford

Field Sample No. B19ND3

Project No. 100846.36000000

Lab Sample No. BC0475

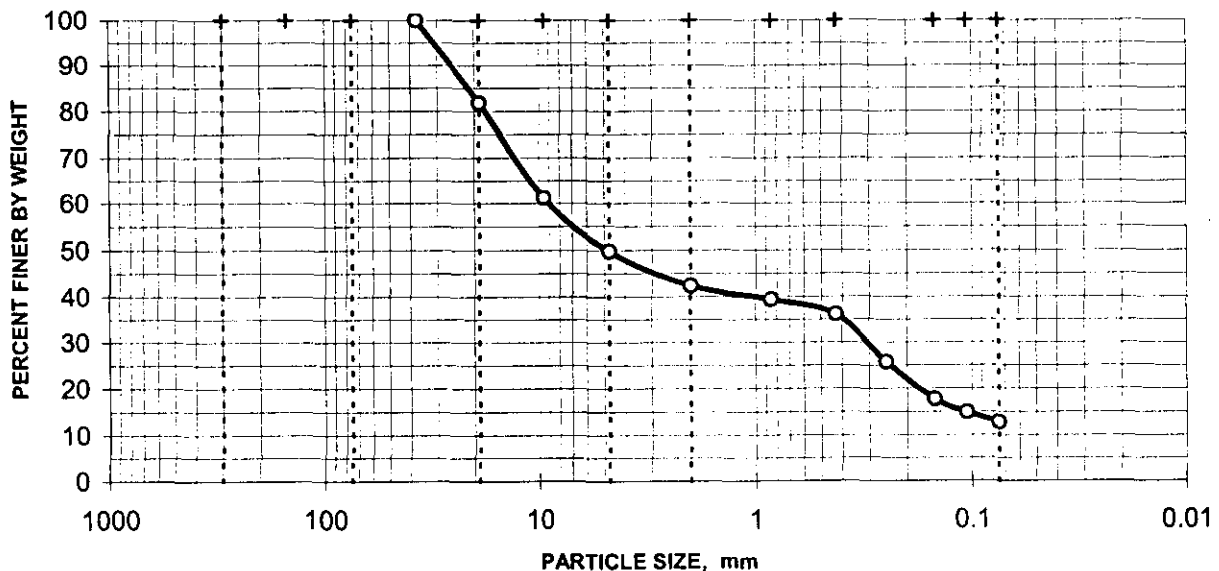
Moisture Content = 12.3%
 based on dry sample weight

SIEVE ANALYSIS

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	81.8%
	0.375"	9.500	61.2%
	#4	4.750	49.7%
	#10	2.000	42.3%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	39.3%
	#40	0.425	36.2%
	#60	0.250	25.6%
	#100	0.149	17.7%
	#140	0.106	14.9%
	#200	0.075	12.7%

DISTRIBUTION CURVE



50.3% Gravel

37.0% Sand

12.7% Silt/Clay

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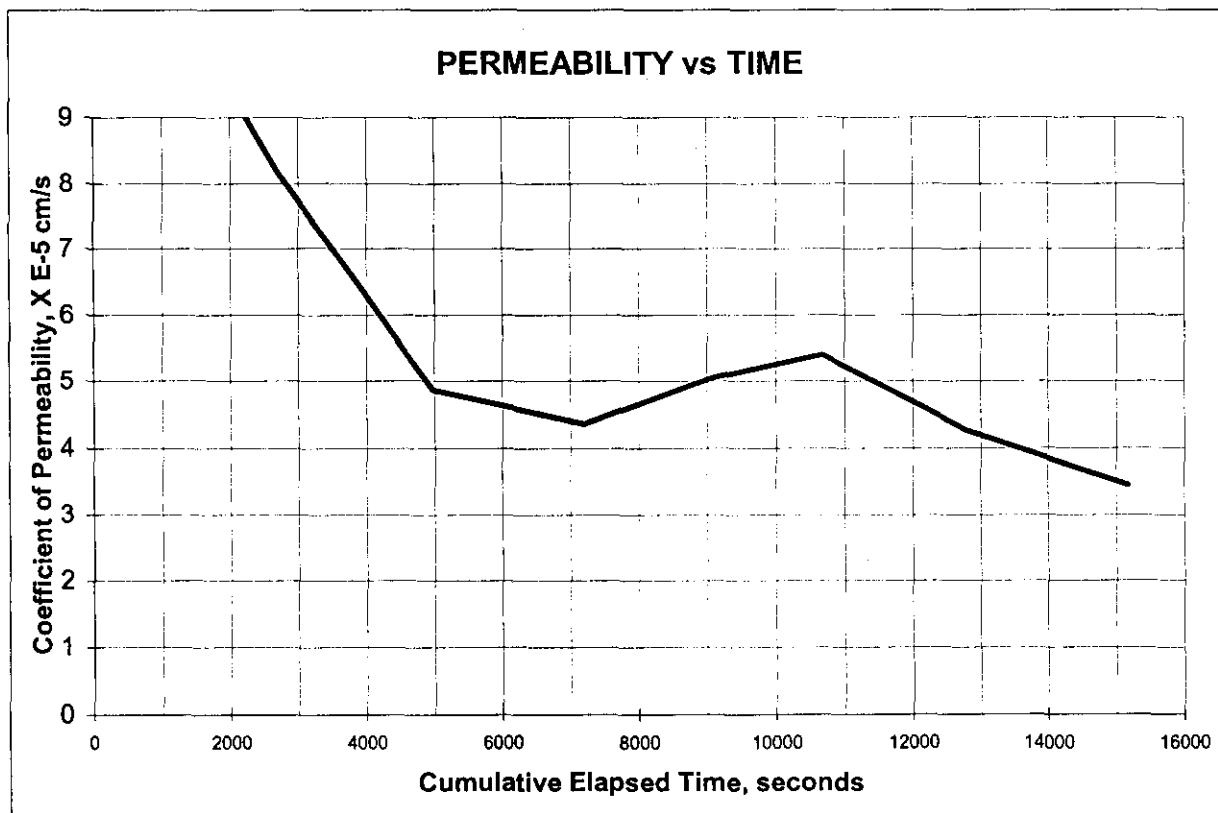
**HYDRAULIC CONDUCTIVITY / PERMEABILITY
 ASTM D 5084**

PROJECT NAME: Eberline Hanford
 PROJECT NO. 100846.36000000

CLIENT SAMPLE NO. B19ND3
 LAB SAMPLE NO. BC0475

	INITIAL	FINAL		
Specimen diameter, cm	6.35		Hydraulic gradient	6.7
Specimen length, cm	5.28		Min. consolidation stress, psi	2.0
Wet weight of specimen, g.	366.87		Max. consolidation stress, psi	2.5
Specimen cross-sect. area, cm ²	31.71		Total backpressure, psi	7.5
Water content, %	12.3			
Wet unit weight, pcf	136.7		Permeant Fluid	Deaired DI Water
Dry unit weight, pcf	121.7			
Degree of saturation, %	95.5			
Specific gravity of solids	2.60			

Coefficient of Permeability, cm/s 4.5E-05



PROJECT NAME: Eberline Hanford **PROJECT NUMBER:** 100846.36000000

[illegible]

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**Carbonate Content of Soils
ASTM D 4373**

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.36000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	CO ₃ , %
BC0475	B19ND3	3

Appendix C
Chain-of-Custody and Request-for-Analysis Records

SDG# H2843

Eberline Srvcas

CHAIN OF CUSTODY

ORD # R4-11-172

11/19/04 10:22:55

WORK ID: SAF# F03-018 SDG H2843

RCVD: 11/18/04 DUE: 01/02/05

KEEP: 01/02/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS			
01A-S	B19ND3	SHAW	DISPOS	E331S	E333S	E335S E342S
=====						

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
<i>[Signature]</i>	11/22/04	<i>Shaw</i>	11/21/04	<i>[Signature]</i>	11-23/04
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____